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Literature review on Mobile Learning
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Mobile Learning in Corporate Businesses: A review of literature focusing on journal articles

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Abstract

The growth in mobile devices has brought many opportunities for corporate businesses via mobile learning. However, corporate businesses seem to be slow in capitalising on mobile learning and limited empirical research has been found addressing this. This paper sets out to find the latest on the subject of mobile learning in corporate businesses by reviewing two prominent journal lists relevant to the Business and Information Systems domain; Australian Business Deans Council (ABDC) and the Computing Research and Education Association of Australasia (CORE). A Systematic Literature Review (SLR) approach was used to uncover the current thinking on the subject, including areas of focus and potential gaps. Findings show that highly ranked journals have neither featured mobile learning in the corporate business context nor do they feature any substantial Australian context. This research highlights the gap within literature and brings practical implication for those researching and intending to contribute to this domain.

Keywords

Mobile, Corporate Learning, Business Model, Literature Review, Training

INTRODUCTION

Mobile learning has many different definitions and is known by many different names like M-Learning, U-Learning, personalised learning, learning while mobile, ubiquitous learning, anytime/anywhere learning and handheld learning (Mehdipur & Zerehkafi, 2013). Most definitions of the term will describe the ability to use mobile devices to support teaching and learning anywhere and anytime (Crescente and Lee, 2011). The heightened interest in mobile learning in recent years is mainly due to the huge growth in the mobile device market such as mobile phone and tablets. The global mobile market has been experiencing phenomenal growth and in 2012 alone it was worth over \$5 billion (Adkins, 2013). This trend is expected to continue with the period between 2012 and 2017 being described as a 'boom phase' where the mobile learning market has been estimated to achieve a five-year compound annual growth rate of 18.2%. Revenue from the mobile learning market is also expected to more than double to \$12.2 billion in 2017. The rate of mobile technology adoption and its influence over the corporate workforce is readily seen. According to market survey company, International Data Corp. (IDC), it is estimated that 75% of the current workforce in the US is a mobile workforce and by 2015 the numbers worldwide will reach 1.3 billion, or a staggering 37.2% of the global workforce (Swoyer, 2012). The mobile workforce is continuously increasing as more workers use mobile devices for work as many are not permanently based in one work location. There are many benefits of using mobile devices and application to support a growing mobile workforce, including for training or employee learning. Some of the key benefits for mobile learning adoption include relatively inexpensive and light weight devices that can be accessed anywhere and anytime, decrease in training costs and multi-media content delivery and creation options (Mehdipur & Zerehkafi, 2013).

Despite the benefits and growth in mobile learning, corporate businesses have not been at the forefront of adopting mobile learning. Findings from Brandon Hall Group's 2013 Mobile Learning Survey confirmed this paradox (Freitfeld, 2013). Even though the survey found that 73% of organisations are currently delivering learning via mobile devices, only a handful is found to harness the full mobile learning capabilities. More than two thirds of organisations surveyed have yet to commit. Most have less than 12 months experience in mobile learning while the better ones claim that their sites are mobile friendly (42%). This shows that the use of mobile devices in the context of learning in corporate businesses is a relatively new phenomenon and to date limited rigorous research has been done even though similar mobile learning research in other fields, especially academia, has been reported much earlier. The literature review conducted by Petrova & Li (2009) on mobile learning found 333 mobile learning articles and papers from 2005 to 2007, of which further in depth analysis shows that there are a large number of articles and papers focusing on technology, educational theory and pedagogy rather than the corporate business context. Some of the key challenges for the adoption of mobile learning include issues with communication connectivity and battery life (especially in rural areas), screen size and key size, content security or copyright issues from authoring groups, multiple standards and operating systems, re-working existing e-learning material for mobile platforms, limited memory and risk of sudden obsolescence (Mehdipur & Zerehkafi, 2013).

Significant value could be gained by reviewing research on mobile learning in corporate businesses given the projected growth in mobile usage in corporate businesses, the mobile workforce and the growth in bring your own device (BOYD) in general (Freitfeld, 2013). Therefore, a Systematic Literature Review (SLR) approach was used to ascertain: 1) what are the latest published research findings in terms of mobile learning in corporate businesses?, and 2) what are the commonalities, trends and potential gaps in research in the field of mobile learning? By understanding what has been published and where there may be research gaps, this review will provide recommendations for further research and development in mobile learning in the context of corporate businesses. To achieve these objectives this paper is structured with the next section addressing the research methodology used to undertake this review, followed by results, analysis, discussion, research limitation, conclusion and further direction.

RESEARCH METHODOLOGY

A SLR approach was taken by planning, conducting and analysing results (Kitchenham and Charters, 2007). The SLR approach was selected for this literature review as it takes a rigorous approach and has been successfully used by other literature reviews of a similar nature, using electronic database searches, such as the literature review conducted by Horita et al. (2013). In planning, the research questions were defined together with the SLR protocol. This was followed by conducting research utilising electronic databases using keywords on the subject with the results evaluated and analysed to garner meaningful results. The next section provides a further description of the research methodology, followed in this literature review, using the approach proposed by Kitchenham and Charters (2007).

Research Questions (RQ)

As a key part of planning this literature review, the following research questions were formulated to gain better insights into how well the subject of mobile learning in corporate businesses is researched and published.

- RQ1) What are the latest published research findings in terms of mobile learning in corporate businesses?
- RQ2) What are the research commonalities, trends and potential gaps in the field of mobile learning?

To operationalize, the broad research questions were broken down into detailed and targeted sub-questions to gain a view of both the depth and breadth of the research findings published in the selected journals as shown in Table 1 and 2 below. The analysis covered both quantitative and qualitative results. Research questions in Table 1 are breadth-based while Table 2 shows depth-based questions.

Search Process

The search process was performed using electronic databases after consultation with librarians and fellow academics that conduct research in the same domain. The Business Source Premier (EBSCO) and ProQuest database search engines were used and the key words 'mobile', 'learning' and 'business' were used to search all parts of the article and search results presented where all three words were found in any part of the article. This was followed by a deeper analysis of articles published over the most recent five full years (2009 to 2013) from

journals listed in the latest 2013 ABDC (Australian Business Deans Council) Journal Quality List (ABDC, 2013) and CORE (Computing Research and Education Association of Australasia) List (CORE, 2013).

A four stage search process was used in this review and is described in Figure 1 below. The search process started by looking at the breadth of literature on the mobile learning subject via Stage 1, 2 and 3 as shown in Figure 1 below. The last stage (Stage 4) of the search process is focused on gaining some depth of the literature published on the subject of mobile learning in corporate businesses.

Table 1. Key Research Questions to ascertain breadth

Breadth-based Research Questions	Rationale/Comment for the Research Question
1. How many papers are published on the subject of mobile learning (and how many are specific to the corporate business sector)?	1. This provides an indication as to how much knowledge is accumulated on the subject in highly ranked journals.
2. What is the rate of literature published on this subject?	2. This provides an indication as to how much interest is being accumulated over time and the velocity of change in interest measured by the number of articles published on the subject over the recent 10 year horizon. This could be used as a possible indicator of research growth/gaps on this subject.

Table 2. Key Research Questions to ascertain depth

Depth-based Research Questions	Rationale/Comment for the Research Question
1. Are the journal articles more focused on learning or technology?	1. This provides a view of whether there is a skew towards learning or technology in research.
2. What are the business considerations for mobile learning to be successful in corporate businesses and how much of the literature addresses this question?	2. The analysis across questions 2, 3, 4 and 5 will provide both a quantitative view, of the amount of literature that focus on key success factors, as well as a qualitative view of key success factors (in terms of what they are and how success is measured).
3. What are the blockers or issues that impede mobile learning to be taken up by corporate businesses and how much of the literature addresses this question?	
4. What are the key success factors for mobile learning in corporate businesses and how much of the literature addresses this question?	
5. How do you measure the success of mobile learning in corporate businesses and how much of the literature addresses this question?	3. This provides a view of whether the field of mobile learning receives more attention from specific regions.
6. Where does the majority of literature come from?	

Stage 1 used the EBSCO and ProQuest Database search tools to gain insights into how many articles have been published on the mobile learning subject. EBSCO has access to over 3,000 business journals, some dating back to 1922. While ProQuest has access to 5,000 databases related to international and regional business, finance and economics. ProQuest includes ABI/INFORM Global database and also databases tailored for Asian and European coverage. A large number of articles were found using the key words 'mobile', 'learning' and 'business' that all needed to be mentioned in the articles. The search results found 154 articles within EBSCO and 3,019 articles were found in ProQuest (published during 2010 to 2014). It was challenging to immediately gauge the quality of these articles given the number of the articles and the lack of transparent quality metrics in either of the databases as mentioned in Straub and Anderson (2010).

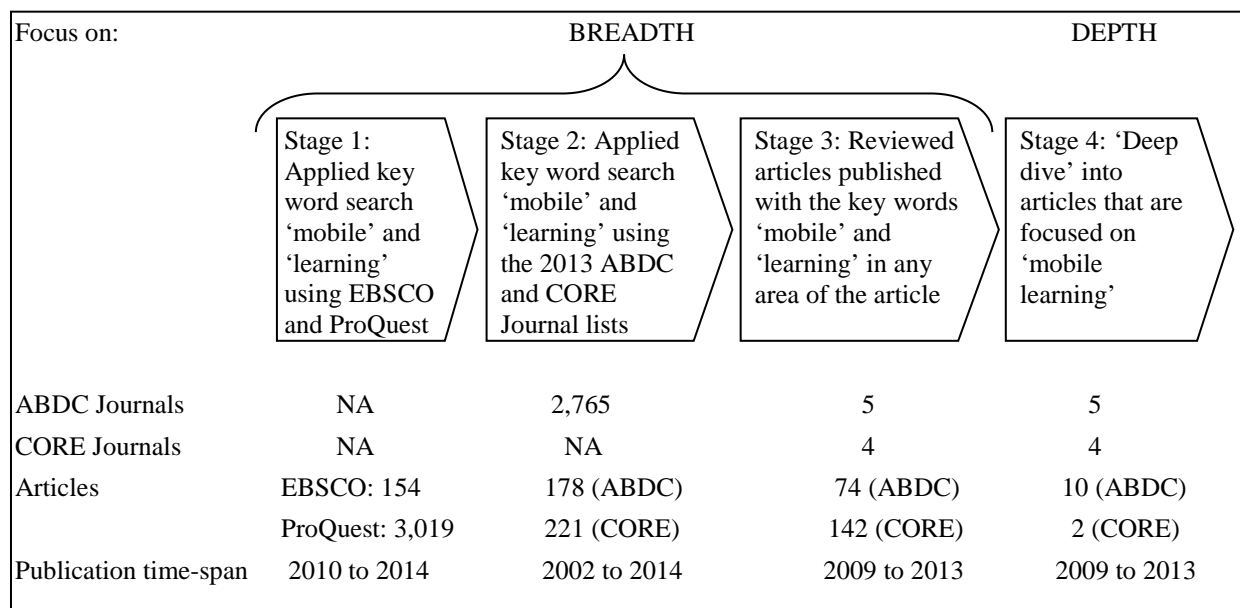


Figure 1: Search Process

In Stage 2, to filter out the required journals from the ABDC list, we first selected journals that had 'learning' in their names and then selected those journals with names that may relate to mobile learning in the business context. Five journals matched the criteria. Due to the low number of results the CORE list was used following the same process which yielded four journals. The CORE list was chosen to ensure that journals with a technology focus were also considered in this review. Apart from this reason, the CORE list has been historically linked to Information System studies, conferences and journal rankings. Even though, the CORE list is no longer used, and not as current as the ABDC, anecdotally it is still used by academics and referred to when it comes to high quality journals. The result of the filtering and the journal's quality category from both the ABDC and CORE list is summarised in Table 3 below.

Both the 2013 ABDC and CORE journal list used in this review are highly credible journal lists designed to be used by Business and Information Systems schools in Australia with the aim to weed out non-impact journals while being disciplined and focused despite the suite of international journals. The ABDC list was also used because of its highly credible stature in the business community and its relevance given the objectives of this paper where a business focus was one of the most important consideration followed by how mobile learning is utilised in a business context. The ABDC list is kept up to date via reviews by an independent chair and discipline-specific panels. The list is also quite current as it was reviewed last in 2013 with the next review expected to occur in 2016-17. The 2013 ABDC Journal Quality List that was used for this study comprised 2,767 different journal titles, divided into four categories of quality, A*: 6.9%; A: 20.8%; B: 28.4%; and C: 43.9% journals.

ANALYSIS AND DISCUSSION

In this section, a summary of the data found in the previous sections will be provided to address the research questions.

In Stage 1 a large number of articles were found using the keywords 'mobile', 'learning' and "business" (154 articles were found within EBSCO and 3,019 articles were found within ProQuest). In order to focus on high quality journal articles and narrow the search space, the ABDC and CORE lists were used where the numbers were further trimmed to a selection of five relevant journals from ABDC and four relevant journals from CORE for further review. In Stage 2, across these selected journals we searched for articles that had the keywords 'mobile' and 'learning' to which we found 178 (from the five ABDC listed journals) and 221 (from the four CORE listed journals) published between 2002 and 2014.

Given the fast pace of change in mobile technology and the mobile business workforce, the analysis and findings need to be recent to be valuable. Hence, in Stage 3 we only retained the articles that were not more than 5 years.

The reduction in timeframe reduced the number of articles to 74 (from the five ABDC listed journals) 142 (from the four CORE listed journals).

Table 3. Selected Journal Name and Quality Category

ABDC Journal Name	Quality Category
Academy of Management Learning and Education	A*
Management Learning	A
Development and Learning in Organizations: an international journal	C
Journal of Workplace Learning: employee counselling today	C
The Learning Organization: the international journal of knowledge and organizational learning management	C
CORE Journal Name	
Journal of Computer Assisted Learning	A
Innovations in Teaching and Learning in Information and Computer Sciences	B
International Journal of Learning	B
Information Technology, Learning and Performance Journal	C

Part 1 – Breadth

This section addresses the breadth-based research questions shown in Table 1 previously. Figure 2 below provides a summary of the number of articles published by during 2002 and 2013 grouped by four quality categories (A*, A, B and C). During 2002 to 2013 there were a total of 28 articles published in A* journals, 174 in A journals, 65 in B journals and 123 in C journals. The rate of publications spiked in 2013 with a total of 75 publications in that year. There were over 40 publications on the subject during 2012, 2010, 2009 and 2007. There is an obvious trend showing that there are significantly more articles published in recent five years (2013 to 2009 with 244 articles) compared to the five years previous to that (2008 to 2004) where only 113 articles were published. This suggests the growing interest on this subject over recent years. To explore this trend further, a deeper analysis of the articles published during 2013 to 2009 was conducted in Stage 3.

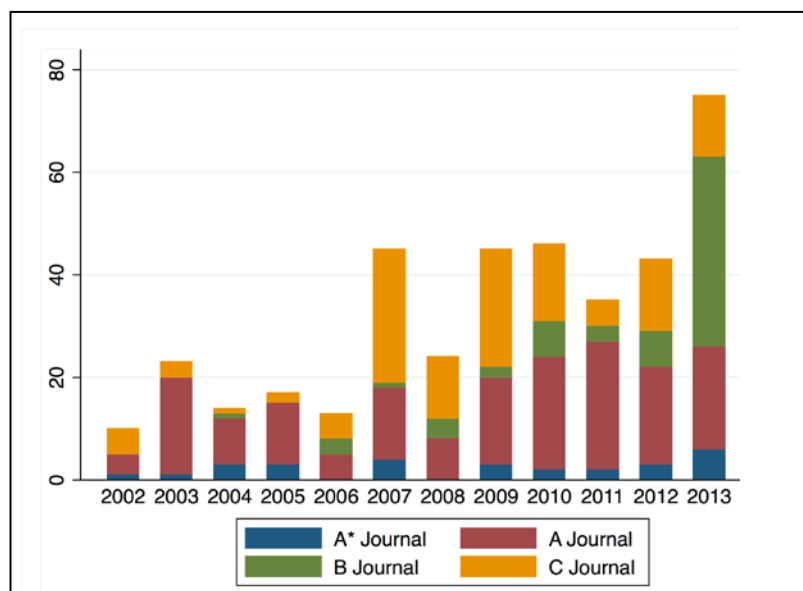


Figure 2: Number of articles with keywords 'mobile' or 'learning' published from the year 2002 to 2013

In stage 3, further analysis has found that out of the 244 articles published during 2009 to 2013; only 12 articles (3 in 2013, 4 in 2012, 1 in 2011, 2 in 2010 and 2 in 2009) were focused on mobile learning in corporate businesses, as shown in Figure 3 below. The remainder of the 222 articles were focused broadly on mobile workforce, mobile telephony, e-learning and student learning. This suggests that although there are many articles published during 2009 to 2013 only a very small number were focused on mobile learning in the corporate

business context. This also suggests that there is a gap or potentially a lag in research publication on the subject of mobile learning in corporate businesses despite the phenomenal growth projected by IDC (Swoyer, 2012).

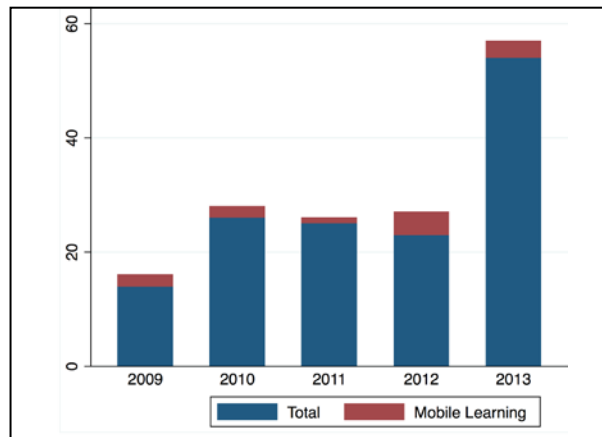


Figure 3: Number of articles with the keywords 'mobile' and 'learning' published from 2009 to 2013

Part 2 – Depth

As mentioned earlier, Stage 4 required a ‘deep dive’ into articles that were only focused in ‘mobile learning’ with a corporate business context. In this stage we found that 10 of the 12 articles (more than 83 per cent) that were focused on mobile learning were published by the C ranked journals such as *Development and Learning in Organizations* (an international journal focusing on Staff development and learning) and the *Journal of Workplace Learning* (a journal that focuses on employee counselling). Only 2 journals were published from the A *Journal of Computer Assisted Learning* and no articles were published on the subject from either A* or B ranked journals. This may reflect the fact that the field of mobile learning has yet to be thoroughly researched and published. Another reason for the small number of publications could be due to the lengthy review process, which could stretch more than a year for top journals, have seen authors shy away as reported by Björk and Solomon (2013). This could mean that higher ranked journals will lag in bringing out contemporary findings and information pertaining to mobile learning that could be beneficial to corporate businesses. Alternatively, such low numbers of publications within the last five years could suggest that research in this field is not up to date with the latest trends in the global mobile learning market and hence could miss out on the opportunities presented in this ‘boom phase’, which justified our effort in conducting this review.

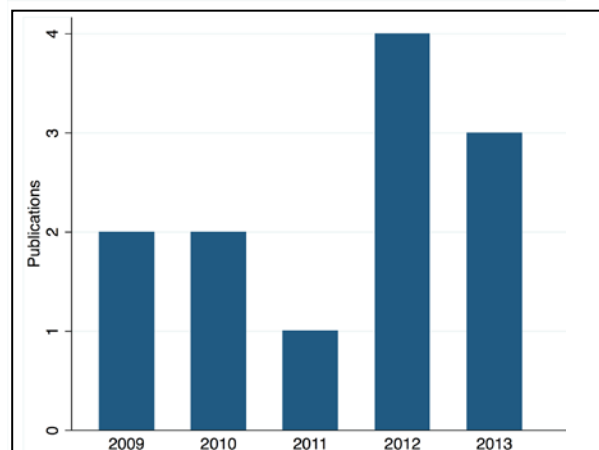


Figure 4: Number of articles covering the subject of mobile learning published from 2009 to 2013

Table 4 lists the twelve articles reviewed in depth that represent some of the latest published research in mobile learning with various focuses. Nine out of the twelve articles have a corporate business focus, one has both a corporate business and education focus and two have a heavy focus on Education. This skew was expected given nine out of the 12 articles come from the *Development and Learning in Organizations* journal – which has a strong corporate business focus. This mix of focus provides a very different result compared to the mobile learning literature review conducted by Petrova & Li (2009), which shows that a pedagogy focused view dominates mobile learning in a business context much more than a technology focus or educational focus.

Petrova & Li also found that contemporary mobile learning research no longer focuses exclusively on technology. However, given the scope of their literature was not limited to mobile learning in the context of businesses, they have found more articles focused on educational theory and pedagogy-focused research. This, in particular, sets our objectives apart from their study.

Table 4. List of Journals reviewed

Journal Name / Year	Article name	Type	Author	Corporate/Education Focus
Development and Learning in Organizations: an international journal				
2013	Considering mobile learning? A case study from Jaguar Land Rover	Case study	A. Wigley	Corporate Focus
2013	M-learning on the up: an interview with Amit Garg, founder of Upside Learning	Viewpoint	G. Bell	Corporate Focus
2012	Interview with Will Chadwick, Vice President UK at Tata Interactive Systems	Viewpoint	G. Bell	Corporate Focus
2012	Interview with Andrew Kilshaw, Chief Learning Officer at Nike Inc.	Viewpoint	W. Strange	Corporate Focus
2012	Those “difficult conversations:” how can technology help managers to learn how to hold them in an effective manner?	Viewpoint	J. Elliott	Education Focus
2010	E-book devices and m-commerce: what might be the impact on organizational learning?	Viewpoint	V. Ratten	Corporate Focus
2010	Alcatel-Lucent University: Customer and employee learning at Alcatel-Lucent University	Technical paper	A. White	Corporate and Education Focus
2009	Learning on the move: how m-learning could transform training and development	Viewpoint	K. Donnelly	Corporate Focus
2009	Taking advantage of e-learning's new tricks: But do they work for old dogs, too?	General review	A. Paradise	Corporate Focus
Journal of Workplace Learning: employee counselling today				
2013	Transitions in medicine: trainee doctor stress and support mechanisms	Research paper	A. Bullock, F. Fox, R. Barnes, N. Doran, W. Hardyman, D. Moss, M. Stacey	Corporate Focus
Development and Learning in Organizations: an international journal				
2012	Understanding mobile learning from the perspective of self-regulated learning	Research paper	L. Sha, C.-K. Looi, W. Chen and B.H. Zhang	Education Focus
2011	Designing a mobile system for lifelong learning on the move	Research paper	X. Gu, F. Gu and J.M. Laffey	Corporate Focus

In answering the first depth based research question we can safely say that there seems to be a balance between the articles that were focused on technology as compared to learning. The review showed that there was five of each. However, there were two articles focused more on how the field of mobile learning is trending to become performance support rather than learning (based on the interview articles of Will Chadwick, Vice President UK Tata Interactive Systems and Amit Garg, founder of Upside Learning), see Figure 5 below.

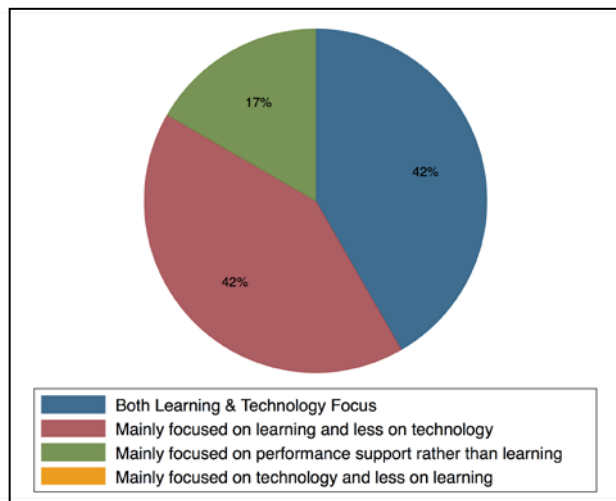


Figure 5: Article Focus

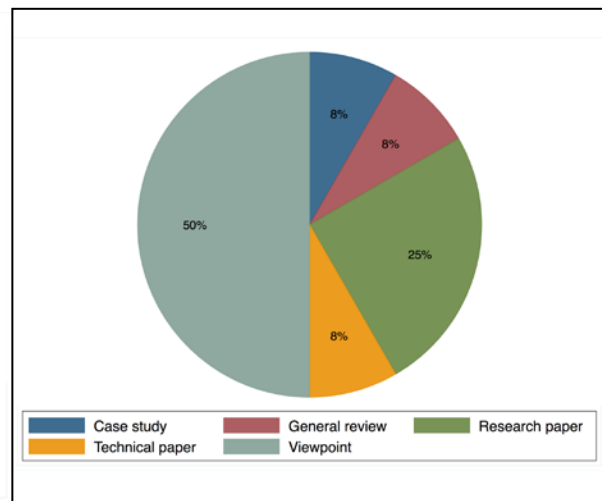


Figure 6: Article Type

Out of the twelve articles analysed in Stage 4, only three were research papers, one was a case study, one was a technical paper, one was a general review while the remaining six were viewpoints and mainly interviews of senior corporate executives (see Figure 6 above). This suggests that the subject of mobile learning in businesses is quite topical but lacks in-depth research (with only three out of the 12 papers being research papers). This raises a lot of questions with regards to the coverage of the subject of mobile learning in scholarly journals apart from their lag (Björk and Solomon, 2013). The findings from this literature review appear to reinforce a not so favourable view with regards to scholarly journals where eager authors may choose other places to publish their research findings outside of A*, A, B and C quality categorised journals. Equally, this would keep knowledge seekers away from looking for thought leadership research on fast paced subjects such as mobile learning in high ranking scholarly journals.

A review on the origin of the publications, as analysed in the context of the last research question, found that the articles failed to capture any Australian business context. Out of the twelve articles almost half of them were based on the United Kingdom with the other two from the USA, two from Asia Pacific while three represented no specific geographical regions. Only one article drew some specific reference to Australia voicing the need for aged workers to be taken into account in e-learning given the increase in the Australian aging workforce. The lack of research originating from Australia may suggest a probable gap within Australia in the field of mobile learning which has reinforced our motivation in doing this review.

The review fell short in addressing the potential research gaps and the remainder of the research questions such as business considerations, issues impeding mobile learning, key success factors and metrics. There was inadequate information due to the low number of journal articles reviewed. However, there were some observable commonalities and general trends amongst the articles. Visibly, several articles mentioned the power of blended learning, describing it as the most effective way for approaching learning in the workplace where mobile learning could play an important part but is not used as the sole learning platform. Also, several other articles were consistent in reporting that a large proportion of learning happens outside of the classroom with technology disaggregating ownership of knowledge and providing it anywhere, anytime (just in time) and in a cost effective and secure manner. Though these commonalities were closely aligned to the research questions none of them were discussed as the main thrust of the article.

RESEARCH LIMITATIONS

The scope of this literature review was limited to publications found using a keyword search on electronic databases and the journals listed in the ABDC and CORE lists. This suggests that the search results are limited by the sophistication of the search tool and those journals on the list. Synonyms of the keywords “mobile”, “learning” and “business” were not used, which would have delivered more results. Further research can be conducted by widening the literature review to other journals and other sources (such as conferences and other books and articles). The authors, to improve the literature review process and findings, will also in future look at the work of Ladd et al. (2010) and Scomvacca (2006).

CONCLUSION AND FUTURE DIRECTION

This paper has presented the analysis, results and discussions using the Systematic Literature Review (Kitchenham and Charters, 2007) methodology on two prominent journal list (i.e. ABCD and CORE) and has found that even though there is a growing need and interest in the field of mobile learning, in corporate businesses, the research in this field is lacking. This is perhaps even more evident when it comes to Australia as most of the publications were from the USA or Europe. The low number of publications also exposes the lag with the top journals to publish research on how to leverage current technological advancements in mobile devices and applications in the corporate business context. Findings shows that C ranked journals are more reflective in representing current trends. Our work confirms findings by Björk and Solomon (2013) and this gives us scope to work with in the near future.

There is much value that can be gained through leveraging mobile technologies for training the Australian workforce and tapping into the phenomenal global growth in the mobile learning market. As the structure of the Australian economy continues to evolve rapidly, only those that harness smart Information Communications Technology (ICT) to deliver globally competitive products and services will thrive (Campbell, 2014). It is recommended that focused research on mobile learning in the Australian corporate business context becomes a priority to take advantage of growing opportunities that mobile learning presents to the Australian economy and our competitiveness in the global marketplace. It is anticipated that future work needs to be focused on reviewing mobile learning business considerations, including blockers or issues that impede mobile learning, and key success factors and measures within the Australian corporate business context.

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